

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference PF04-704PCT	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/KR2004/001391	International filing date(day/month/year) 11 JUNE 2004 (11.06.2004)	Priority date (day/month/year) 13 JUNE 2003 (13.06.2003)	
International Patent Classification (IPC) or national classification and IPC IPC7 F04C 18/344			
Applicant HYUN, Kyung-Yul			

- This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 4 sheets, including this cover sheet.
- This report is also accompanied by ANNEXES, comprising:
 - ☒ (sent to the applicant and to the International Bureau) a total of 8 sheets, as follows:
 - ☒ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____ containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box relating to Sequence Listing (see Section 802 of the Administrative Instructions).

- This report contains indications relating to the following items:

- ☒ Box No. I Basis of the report
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand 30 DECEMBER 2004 (30.12.2004)	Date of completion of this report 27 SEPTEMBER 2005 (27.09.2005)
Name and mailing address of the IPEA/KR  Korean Intellectual Property Office 920 Dunsan-dong, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer KIM, Eun Rae Telephone No. 82-42-481-5518 

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/KR2004/001391

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

- ☒ This report is based on translations from the original language into the following language English which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
- ☒ publication of the international application (under Rule 12.4)
- ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements** of the international application, this report is based on (replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):

- ☐ the international application as originally filed/furnished
- ☒ the description:
 pages 1-30, 32
 pages* 31 received by this Authority on 13.04.2005 as originally filed/furnished
 pages* _____ received by this Authority on _____
- ☒ the claims:
 pages _____
 pages* _____ as originally filed/furnished
 pages* 33-38 as amended (together with any statement) under Article 19
 pages* _____ received by this Authority on 13.04.2005
 pages* _____ received by this Authority on _____
- ☒ the drawings:
 pages 1/13, 2/13, 4/13 - 13/13
 pages* 3/13 as originally filed/furnished
 pages* _____ received by this Authority on 13.04.2005
 pages* _____ received by this Authority on _____
- ☐ the sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☒ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☒ the claims, Nos. 23, 24
- ☐ the drawings, sheets _____
- ☐ the sequence listing (specify): _____
- ☐ any table(s) related to sequence listing (specify): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets _____
- ☐ the sequence listing (specify): _____
- ☐ any table(s) related to sequence listing (specify): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/KR2004/001391

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)

Claims 1 - 22

Claims

YES

NO

Inventive step (IS)

Claims 1 - 22

Claims

YES

NO

Industrial applicability (IA)

Claims 1 - 22

Claims

YES

NO

2. Citations and explanations (Rule 70.7)

Reference is made to the following documents:

D1: JP 63-045486 A

D2: JP 01-208588 A

D3: JP 01-092597 A

1. Novelty and Inventive Step

D1 relates to a compressor, wherein a web plate hub part (145) is arranged integrally onto the outer periphery of a shaft (125), and a web plate (143) having the form bent into a wave form is installed onto the periphery. On the both sides of the web plate (143), a vane (151) which is closely attached onto the outer surface of the web plate (143) and nips the web plate is arranged.

D2 relates to a compressor, wherein a wave plate (12) which is rotated in a pump chamber (3) is joined to a shaft (10) rotatably supported by a pump housing (2), and a vane (13) which is reciprocated in the pump chamber (3) is slidingly brought into contact with both side faces and the outer peripheral face of the wave plate (12).

D3 relates to a compressor, wherein a pump housing (2) is disposed in a cup-shaped cover (1), and a wave plate (12) formed and bent into corrugated form is rotatably received in a cylinder chamber (39) within said pump housing. U-shaped vanes (13) are disposed on both sides of said plate (12) to be reciprocated in a vane groove (18) of respective valve assemblies (6, 7) disposed in front and rear portions of the pump housing (2).

(Continued on Supplemental Sheet.)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

Claims 1 and 17 relate to a fluid pump and a fluid motor, comprising a rotating chamber defined by first, second and third wall surfaces, a rotor including a vane, and a pair of blocking walls, wherein a suction port (an inlet port) and a discharge port (an outlet port) are provided at both positions adjacent to the pair of the blocking walls which are interposed between the ports. Said fluid pump and motor are characterized by having a suction groove position and a discharge groove position which is respectively connected to the suction port and the discharge port, and which connects both spaces outside vanes on the third wall surface.

D1-D3 do not disclose such suction groove position and a discharge groove position as disclosed in claims 1 and 6 of the present application. In addition, said features are not obvious to a person skilled in the art.

Therefore, the subject matter of claims 1 and 17 and claims 2-16 and 18-22 which are respectively dependent on claim 1 and 17 is considered to be novel under PCT Article. Since the combination of D1-D3 cannot destroy the inventive step of claims 1-22, the subject matter of claims 1-22 is also considered to involve an inventive step under PCT Article 33(3).

2. Industrial Applicability

Since claims 1-22 relate to a fluid pump and a fluid motor, the subject matter of claims 1-22 is considered to be industrially applicable under PCT Article 33(4).

constructed by mounting a check valve for preventing backflow of the fluid within each discharge tube.

5 Figs. 15 to 17 are views of a main body of a fluid pump according to a third embodiment of the present invention. Referring to Figs. 15 to 17, a suction tube 15b is branched off into two passages which in turn are connected to sides of wing portions 28 of two end walls 22b and 24b of the housing 20b. A discharge tube 16b is also branched off into two passages which in turn are connected to sides of the wing portion 28b of the two end walls 22b and 24b of the housing 20b. The housing 20b is the same as the housing 20b of the fluid pump of the aforementioned second embodiment in their 10 constitutions except that the housing 20b does not have the suction groove 261a, the discharge groove 262a and the passage holes 282a at both ends of the wing portion 28a. Therefore, a detailed description thereof will be omitted.

Referring to Figs. 16 and 17, a linear moving object 50b has a structure substantially similar to that of the linear moving object 50 of the first embodiment 15 shown in Fig. 5. The linear moving object 50b includes two contact members 58b that are slidably fitted at opposite positions in two blocking walls 54b and 56b, respectively, and slide against a vane (not shown). Each of the blocking walls 54b and 56b is provided with a receiving groove 511b into which the contact member 58 is fitted, a passage hole 512b communicating with the receiving groove 511b, and a connecting 20 groove 59b. The receiving grooves 511b are open while facing each other at opposite ends of the two blocking walls 54b and 56b and also open upwardly at upper ends 541b and 561b of the two blocking walls 54b and 56b. The passage holes 512b are formed on discharge sides of the blocking walls 54b and 56b to communicate with the respective receiving grooves 511b. A high-pressure fluid on the discharge sides is 25 supplied to the receiving grooves 511b through the passage holes 512b. The connecting grooves 59b are formed on suction sides of the blocking walls 54b and 56b. Each connecting groove 59b connects both ends of each of the blocking walls 54b and 56b. A low-pressure fluid on the suction sides are supplied to guide passages 281b through the connecting grooves 59b to cause the linear moving object 50b to move 30 smoothly.

CLAIMS

1. A fluid pump, comprising:

5 a rotating chamber defined by first and second opposite wall surfaces and a third cylindrical wall surface for connecting the first and second wall surfaces to each other;

10 a rotor rotating about a rotating axis passing through the centers of the first and second wall surfaces within the rotating chamber, and including a hub with an outer circumferential surface and a vane protruding radially outwardly from the outer circumferential surface of the hub and having an outward radial tip which is slidably brought into close contact with the third wall surface of the rotating chamber, the vane further including a leading end which is slidably brought into close contact with the first wall surface of the rotating chamber, a trailing end which is slidably brought into close contact with the second wall surface of the rotating chamber, and inclines for connecting the leading and trailing ends; and

15 a pair of blocking walls cooperating with the vane and linearly moving upon rotation of the rotor, each of the blocking walls having an opposite edge facing each other, the opposite edges of the blocking walls being slidably brought into close contact with both side surfaces, other edges of the blocking walls adjacent the opposite edges being slidably brought into close contact with the outer circumferential surface of the hub of the rotor;

20 wherein a suction port for suction of a fluid and a discharge port for discharge of the fluid are provided at both positions adjacent to the pair of the blocking walls which are interposed between the ports;

25 wherein the third wall surface of the rotating chamber is provided with a suction groove positioned adjacent to the pair of the blocking walls and connected to the suction port to connect both spaces separated by the vane to each other, and a discharge groove positioned adjacent to the pair of the blocking walls and connected to the discharge port to connect the both spaces separated by the vane to each other.

2. The fluid pump as claimed in claim 1, wherein the pair of the blocking walls is formed integrally with each other.

5 3. The fluid pump as claimed in claim 1, wherein the leading and trailing ends of the vane are formed to be brought into surface contact with the first and second wall surfaces of the rotating chamber, and the width of the radial tip of each of the leading and trailing ends of the vane is formed to be larger than a maximum distance between the corresponding suction and discharge grooves.

10 4. The fluid pump as claimed in claim 1, further comprising first and second pressing plates which define the first and second wall surfaces of the rotating chamber, linearly move along the rotating axis and are slidably brought into close contact with the leading and trailing ends of the vane by an external force.

15 5. The fluid pump as claimed in claim 4, wherein the pressing plates are urged toward the rotating chamber by the fluid on a high-pressure side.

20 6. The fluid pump as claimed in claim 4, wherein the pressing plates are urged toward the rotating chamber by an elastic member.

7. The fluid pump as claimed in any one of claims 1 to 6, further comprising a pressure-regulating device for regulating pressure of the fluid discharged from the discharge ports and supplied to a load side.

25 8. The fluid pump as claimed in claim 7, wherein the fluid discharged from the discharge ports flows toward a return passage communicating with a low-pressure side and a discharge passage communicating with the load side through first and second branched passages, respectively; and the pressure-regulating device includes a discharge amount regulating unit having a moving member for moving according to the pressure of the fluid in the discharge passage to open and close the first passage and a check
30

valve provided in the second passage.

5 9. The fluid pump as claimed in claim 8, wherein the pressure-regulating device further comprises an elastic member for urging the moving member in a direction opposite to a direction in which the pressure of the fluid in the discharge passage is exerted on the moving member.

10 10. The fluid pump as claimed in any one of claims 1 to 6, wherein two leading ends, two tailing ends and two pairs of blocking walls are provided, and suction and discharge grooves are provided adjacent the two pairs of the blocking walls while being separated by the two pairs of blocking.

15 11. The fluid pump as claimed in claim 10, further comprising a pressure-regulating device for regulating pressure of the fluid discharged from the discharge ports and supplied to a load side.

20 12. The fluid pump as claimed in claim 11, wherein the fluid discharged through the two discharge ports provided at the discharge grooves flows toward first and second passages connected to a return passage communicating with a low-pressure side and toward third and fourth passages connected to a discharge passage communicating with a load side, and the pressure-regulating device includes a discharge amount regulating unit having a moving member for moving according to the pressure of the fluid in the discharge passage to open and close the first or second passage and first and second check valves provided in the third and fourth passages, respectively.

25 30 13. The fluid pump as claimed in claim 12, wherein the pressure-regulating device further comprises an elastic member for urging the moving member in a direction opposite to a direction in which the pressure of the fluid in the discharge passage is exerted on the moving member.

14. The fluid pump as claimed in any one of claims 8, 9 and 11 to 13, wherein the pressure-regulating device further includes an accumulating portion.

5 15. The fluid pump as claimed in claim 14, wherein the accumulating portion includes a moving member for moving by receiving the pressure of the fluid in the discharge passage, and an elastic member for urging the moving member in a direction opposite to a direction in which the pressure of the fluid is exerted on the moving member.

10 16. The fluid pump as claimed in any one of claims 1 to 6, wherein the pair of blocking walls have contact members that are brought into contact with both side surfaces of the vane, and each of the pair of blocking walls is provided with a receiving groove for receiving the contact member and a passage hole for causing the receiving groove to communicate with a discharge side.

15

17. A fluid motor, comprising:

a rotating chamber defined by first and second opposite wall surfaces and a third cylindrical wall surface for connecting the first and second wall surfaces to each other;

20 a rotor rotating about a rotating axis passing through the centers of the first and second wall surfaces within the rotating chamber, and including a hub with an outer circumferential surface and a vane protruding radially outwardly from the outer circumferential surface of the hub and having an outward radial tip which is slidably brought into close contact with the third wall surface of the rotating chamber, the vane further including a leading end which is slidably brought into close contact with the first wall surface of the rotating chamber, a trailing end which is slidably brought into close contact with the second wall surface of the rotating chamber, and inclines for connecting the leading and trailing ends; and

25 30 a pair of blocking walls cooperating with the vane and linearly moving upon rotation of the rotor, each of the blocking walls having an opposite edge facing each

other, the opposite edges of the blocking walls being slidably brought into close contact with both side surfaces, other edges of the blocking walls adjacent the opposite edges being slidably brought into close contact with the outer circumferential surface of the hub of the rotor;

5 wherein an inlet port for inflow of a fluid and an outlet port for outflow of the fluid are provided at both positions adjacent to the pair of the blocking walls which are interposed between the inlet and outlet ports;

10 wherein the third wall surface of the rotating chamber is provided with an inflow groove positioned adjacent to the pair of the blocking walls and connected to the inlet port to connect both spaces separated by the vane to each other, and an outflow groove positioned adjacent to the pair of the blocking walls and connected to the outlet port to connect the both spaces separated by the vane to each other.

15 18. The fluid motor as claimed in claim 17, wherein the pair of the blocking walls is formed integrally with each other.

20 19. The fluid motor as claimed in claim 17, wherein the leading and trailing ends of the vane are formed to be brought into surface contact with the first and second wall surfaces of the rotating chamber, and the width of a radial tip of each of the leading and trailing ends of the vane is formed to be larger than a maximum distance between the corresponding inflow and outflow groove.

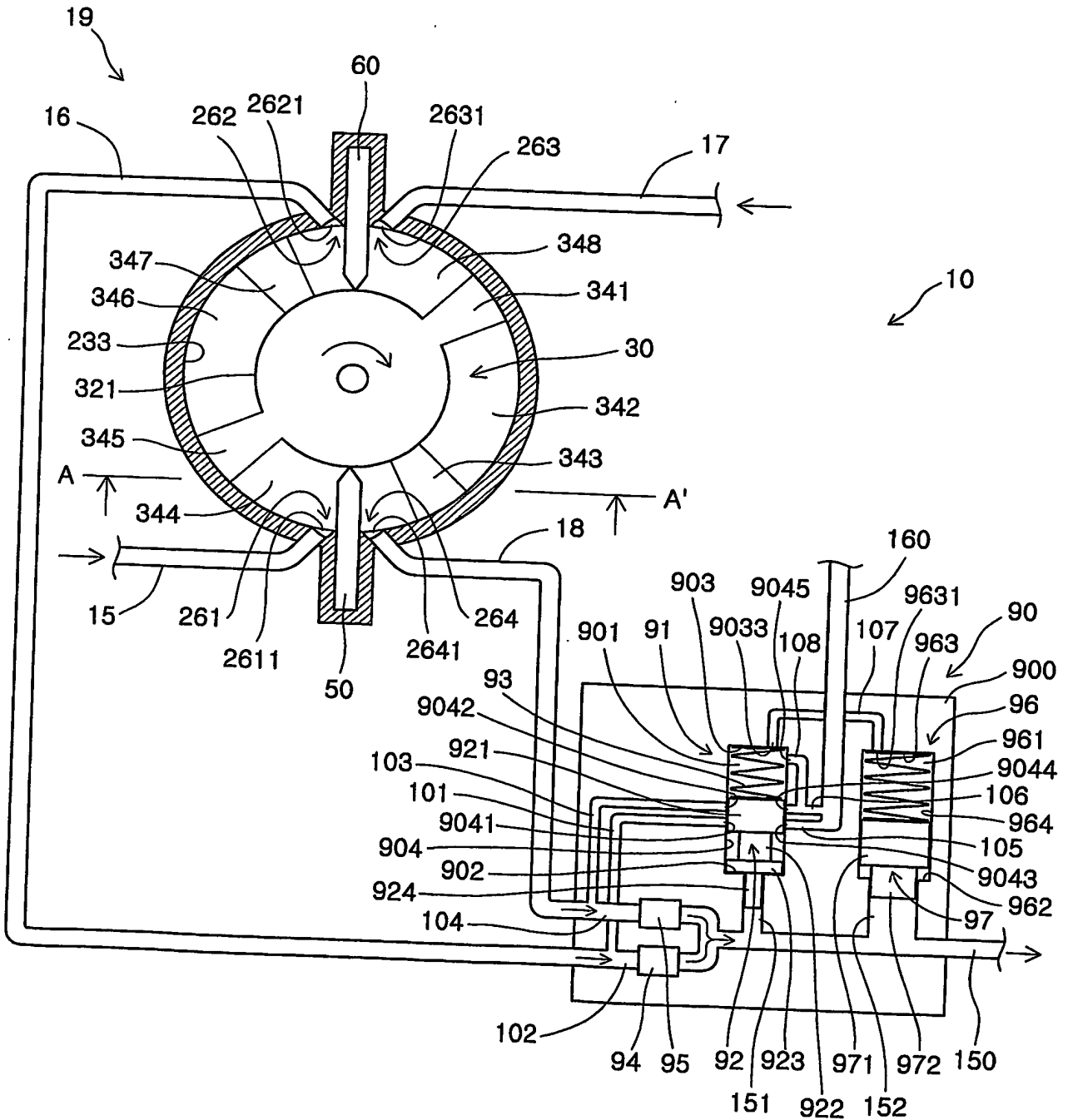
25 20. The fluid motor as claimed in claim 17, further comprising first and second pressing plates which form the first and second wall surfaces of the rotating chamber, linearly move along the rotating axis and are brought into close contact with the leading and trailing ends of the vane by an external force.

30 21. The fluid motor as claimed in claim 20, wherein the pressing plates are urged toward the rotating chamber by the fluid on a high-pressure side.

22. The fluid motor as claimed in claim 20, wherein the pressing plates are urged toward the rotating chamber by an elastic member.

Fig. 3

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